1 # Conversion of unit
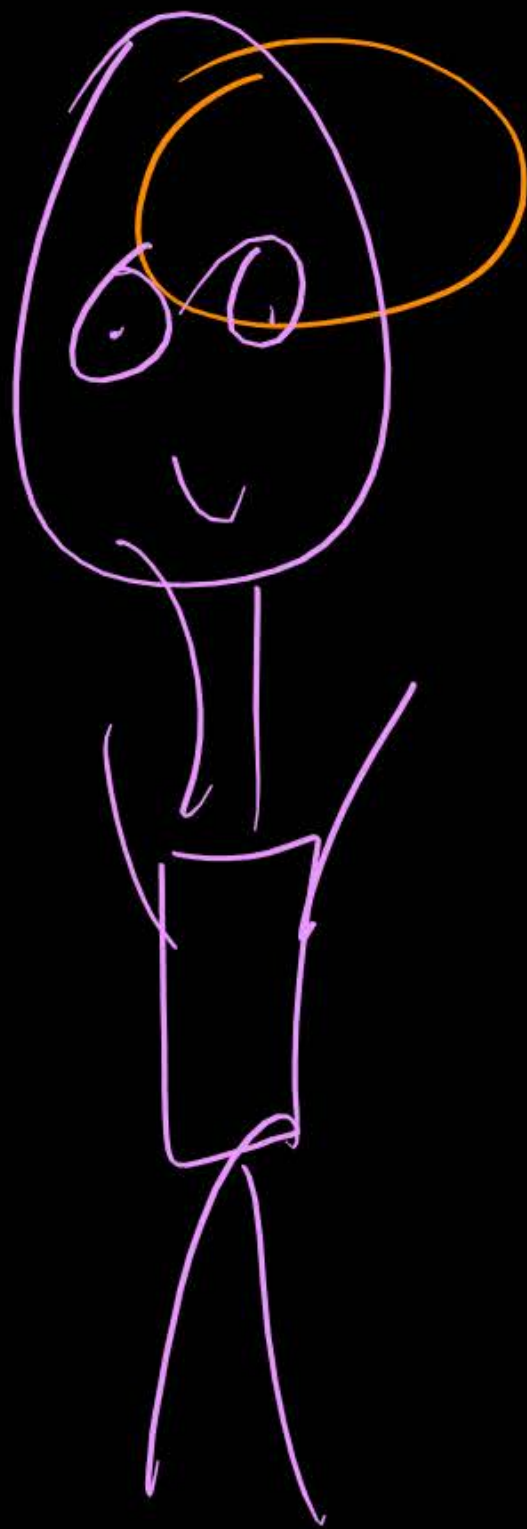
2 PhD on dimension

3

4

Which of the following is a characteristic of unit?

1 The unit must be universally accepted

2 It must be invariable and well defined

3 It must be of suitable size and easily available

4 All the above

Likho

Characteristic of unit

Universally accepted
invariable
suitable size
easily available

(Likho)

$l = 1m = 100 cm$

numerical value → (arrow to 1)
SI Unit → (arrow to m)
C-G-S unit → (arrow to cm)
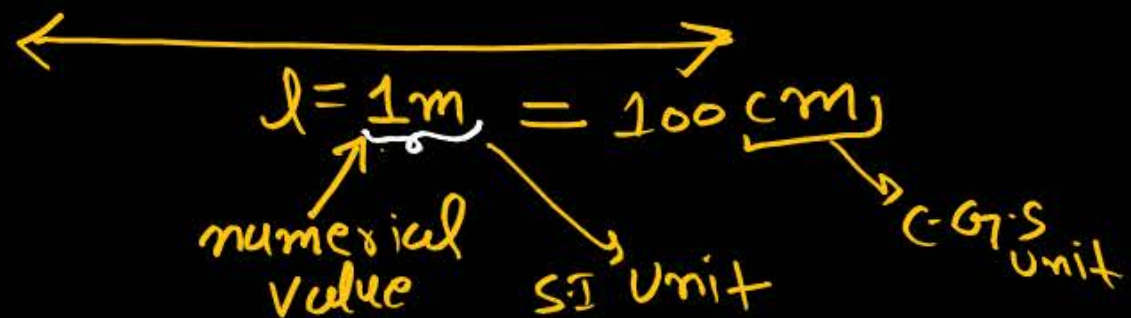
Any measured P.Q. reprenst in it numerical value & its unit in which numerical value is represent.
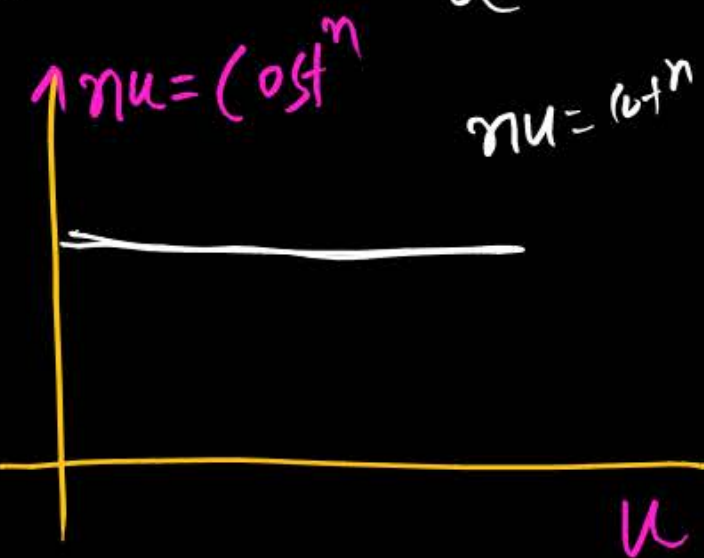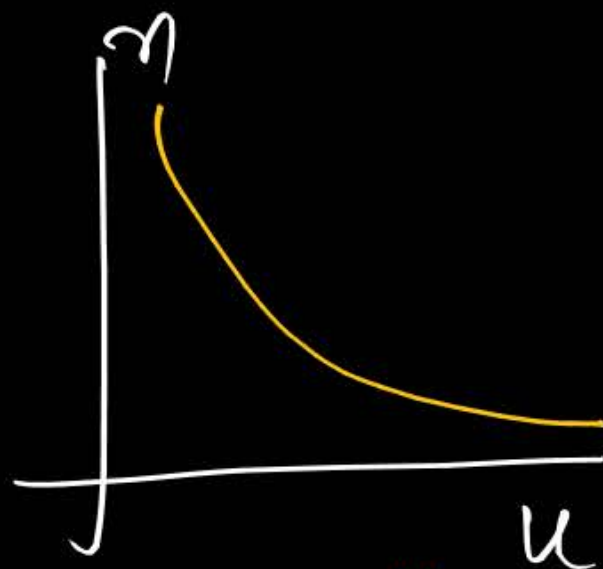
$$nu = Cot^n$$

$\downarrow nu \uparrow = (c+n)$

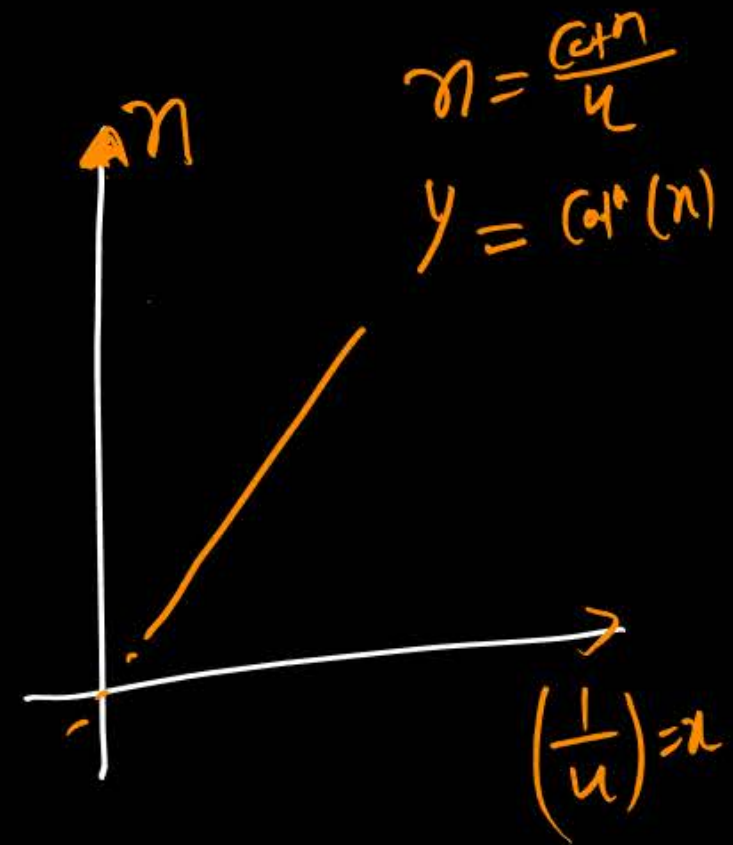n = numerical value of P.Q.

U = Unit in Phich P.Q. is meanwet or expren

$$n_1 u_1 = n_2 u_2 \checkmark$$

$$n \propto \frac{1}{u}$$

$$n \propto \frac{1}{u}$$

$nu = Cost^n$

$nu = c+n$

$n \propto \frac{1}{u}$

$n = \frac{c+n}{u}$

$y = c^{r^*}(n)$

$\left(\frac{1}{u}\right) = x$

$\left(\frac{1}{n}\right)$

$(u$
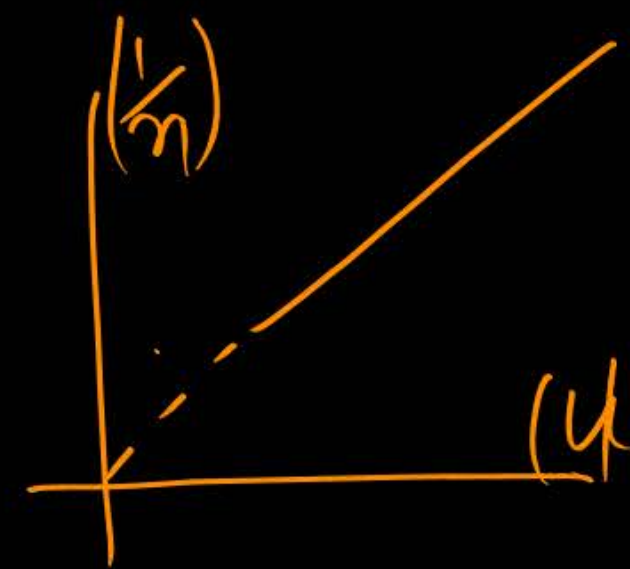
If area of object is $5m^2$ then find its value in CGS unit?

Sol^n

Area is given is $S \cdot I$ unit $= 5m^2$

n_1 unit (u_1)

$n_1 u_1 = n_2 u_2$

$S \cdot I$ $C.G.S$

$5 \times m^2 = n_2 \, cm^2$

$5 m^2 = 50000 \, cm^2$

same Ans

$5 \times (100 cm)^2 = n_2 \, cm^2$

$5 \times 10^4 \, cm^2 = n_2 \, cm^2$

$n_2 = \underline{50000}$

Area $= 5 \, m^2$

$= 5(100 cm)^2$

$= 5 \times 10^4 \, cm^2$

Convert 25 m/sec in CGS unit?

$$\text{Velocity} = \frac{25 \, m}{sec}$$

$$= \frac{25 \, (100 \, cm)}{sec}$$

$$\boxed{\text{Velocity} = 2500 \, ^{cm}/_{sec}.}$$

SI   CGS

Velocity $\longrightarrow$ m/s $\longrightarrow$ cm/sec

force $\longrightarrow$ $kg \frac{m}{s^2}$ $\longrightarrow$ $grm \times \frac{cm}{s^2}$ dn

Engy $\longrightarrow$ $kg \, m^2/s^2$ $\longrightarrow$ $grm \frac{(cm)^2}{s^2}$

Mass
density $\longrightarrow$ $\frac{kg}{m^3}$ $\longrightarrow$ $\frac{grm}{cm^3}$

Convert 1 Newton into Dyne.

S.I   C.G.S.

$$1kg = 1000\, grm = 10^3\, gm$$

Force $= 1N$

$$= 1\left(\frac{kg\, m}{s^2}\right)$$

$$= \frac{1 \times 10^3\, grm \times 10^2\, cm}{s^2}$$

$$= 10^5\, grm\, cm/s^2$$

$$= 10^5\, dyne$$

2nd method

$$nu = cost$$

$$n_1 u_1 = n_2 u_2$$

S.I unit   C.G.S

$$1\frac{kg\, m}{s^2} = n_2\left(\frac{grm\, cm}{s^2}\right)$$

$$\frac{1 \times 10^3\, gm \times 10^2\, cm}{s^2} = n_2\frac{grm\, cm}{s^2}$$

$$n_2 = 10^5$$

Convert values of 10 Joule in CGS unit?

$$E = 10 (J)$$

$$= 10 \left[Kg \, m^2/s^2 \right]$$

$$= 10 \, \frac{\times 10^3 \, gm \times (10^2 \, cm)^2}{s^2}$$

$$= 10 \left[\frac{10^3 \, gm \times 10^4 \, cm^2}{s^2} \right)$$

$$= 10 \times 10^7 \, \frac{gm \, cm^2}{s^2}$$

$$\boxed{1 J = 10^7 \, erg}$$

S.I   C.G.S.

Level up

If unit of length becomes double than S-I unit of length, then area $5m^2$ in [new unit] will be ??

Sol^n New
unit of lengt [$1m' = 2m$] ✓

$$1m = \frac{1m'}{2}$$

$$Area = 5m^2 = 5\left(\frac{1m'}{2}\right)^2 = \frac{5}{4} m'^2$$

If unit of length 10m and unit of mass is 5 kg and unit of time is 2 sec then, find value of 10 Joule energy is new system of unit.

In new system

$$1m' = 10m$$
$$1kg' = 5kg$$
$$1s' = 2sec$$

Sol^n

S.I un

$$Energy = 10J$$

$$= 10\left(kg\frac{m^2}{s^2}\right)$$

$$= 10 \times \frac{kg'}{5} \times \left(\frac{2m'}{10}\right)^2 \frac{1}{\left(\frac{2'}{2}\right)^2}$$

$$= 10 \frac{kg'\,m'^2}{5\times\frac{100}{25}\times\frac{1}{4}\,s'^2} = \left(\frac{10}{125}\right)\frac{kg'm'^2}{s'^2}$$

If unit of length 10m and unit of mass is 5 kg and unit of time is 2 sec then, find unit of energy in new system

In S.I unit

$l = 1\,m$

$Mass = 1\,kg$

$Time = 1\,s$

$E = 1J = 1\,kg\,m^2/s^2$

New sys.

$1\,m' = 10\,m$

$1\,kg' = 5\,kg$

$2s' = 2s$

$E' = \dfrac{kg'\,m'^2}{s'^2}$

Unit of engy In new sys.

$= \dfrac{kg'\,m'^2}{s'^2}$

$= \dfrac{5kg \times (10m)^2}{(2s)^2}$

$= \dfrac{5 \times 100\,kg\,m^2}{2^2\,s^2}$

$\dfrac{kg\,m^2}{s'^2} = 125\,\dfrac{kg\,m^2}{s^2}$

① If unit of length in new system is 2m and unit of mass is 10kg & unit of time 4sec then find value of $\boxed{15 \, N \text{ force}}$ in new system.

Soln

$1m' = 2m$

$1kg' = 10kg$

$1s' = 4sec$

$$\text{force} = 15 \, N$$

$$= 15 \, kg \, m/s^2$$

$$= 15 \times \frac{1kg'}{10} \times \frac{1m'}{2} \cdot \frac{1}{\left(\frac{1s'}{4}\right)^2} = \frac{15 \times \overset{8}{16}}{10 \times 2} \frac{kg' m'}{s'^2} = (12) \frac{kg' m'^2}{s'^2}$$

② If unit of length in new system is 2m and unit of mass is 10kg & unit of time 4sec then find unit of force in new system.

$1m' = 2m$

$1kg' = 10kg$

$1s' = 4sec$

$$\boxed{\text{force} = \frac{kg' \, m'}{s'^2}}$$

$$= \frac{10kg \times 2m}{(4s)^2} = \frac{20}{16} \left(\frac{kg \, m}{s^2}\right) = \frac{20}{16} N = \frac{5}{4} N$$

unit of force in new syst

Q) In new system of unit, length is $x\,m$ and mass is $y\,kg$. then Value of $\boxed{\text{density } 5\,kg/m^3}$ in new system will be.

S.I unit

Soln

$$\boxed{\begin{array}{c} 1m' = x\,m \\ 1kg' = y\,kg \end{array}}$$

density $= 5\,kg/m^3$

$$= 5\,\dfrac{1\,kg'}{y\,\left(\dfrac{1m'}{x}\right)^3} = \dfrac{5}{y}\,\dfrac{kg'}{\dfrac{m'^3}{x^3}}$$

$$= \dfrac{5x^3}{y}\left(\dfrac{kg'}{m'^3}\right)$$

Q) In new system of unit length is $x\,m$ and mass is $y\,kg$. then Unit ot density in new system.

Unit of density $= \dfrac{kg'}{m'^3} = \dfrac{y\,kg}{(x\,m)^3} = \dfrac{y}{x^3}\left(kg/m^3\right)$
In new

mass of object is $m = 10 kg$ ✓ moviy with velocity $4 m/s$ ✓ find its momentum in **S.I** & **C.G-s** Unit.

Sol^n

$P = m v$

$= 10 kg \, (4 m/s)$

$= 40 \, kg \, m/s$

$P = 40 \dfrac{kg \, m}{s} = 40 \dfrac{\times 10^3 \, gm \times 100 \, cm}{s}$

$= 40 \times 10^5 \left(\dfrac{gm \, cm}{s} \right)$

$= 4 \times 10^6 \, gm \, cm/s$

mass of object is $m = 10\,kg$ moving with velocity $4\,m/s$ find
its K.E in SI & C.G.s unit.

Sol^n

$$K.E = \frac{1}{2}mv^2$$

$$= \frac{1}{2} \times 10\,(4)^2$$

$$= \frac{1}{2} \times 10 \times \overset{8}{\cancel{16}}$$

$$\boxed{K.E = 80\ Kg\ \frac{m^2}{s^2}}$$

S.I Unit

$$\boxed{K.E = 80\ Kj\ \frac{m^2}{s^2}}$$

$$= 80\ \times 10^3 gm \times \frac{(100cm)^2}{s^2}$$

$$= 80 \times 10^7\ gm\ \frac{cm^2}{s^2}$$

MR# BOX

S.I value दिया हो $\longrightarrow$ C.G.S ya new system of unit में value puchhe.

$\longrightarrow$ S.I value में value Jodiya hai likho then S.I unit ko new imp convert o

Risi P.Q. Ka new system me (unit puhhe)

$\longrightarrow$ (Ugh P.Q. Ka new system) में unit liko and ugko S.I में Convert Karo.

Dimension

- Area $= L^2$

- Volume $= L^3$

- Velocity $= LT^{-1}$

- Acceleration $= LT^{-2}$

- Force $= MLT^{-2}$

- Energy $= ML^2T^{-2}$

- Power $= ML^2T^{-3}$

- Momentum $= m \times v = MLT^{-1}$

- Impulse $($chge in momt$) = MLT^{-1}$

displacement , dist^n , length , Radius , focal length , Position. Height , Radius of curvature

$$\hookrightarrow m^0 L^1 T^0$$

velocity , speed , orbital velcity , Scape velocity , Terminal velocity Drift velocity , critical velocity , ~~Angul velocity~~ (relative velaity) speed of Light.

$$\hookrightarrow L T^{-1}$$

acc^n due to gravity , acc^n , Tangentie acc^r , centripete acc^n ~~angula acc^n~~

$$\hookrightarrow L T^{-2}$$

* Angular velocity
$$\omega = \frac{\theta}{T} = T^{-1}$$

* Angula acc$^n = \frac{\omega}{T}$
$$= \frac{T^{-1}}{T} = T^{-2}$$

K.E , Potential energy , Heat energy , mechanical energy , gravitational P.E, magnetic energy , elastic Potential, spring Potential energy.

$$\left(m\ L^2\ T^{-2} \right)$$